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Care workers health in Swiss Nursing Homes and its association with Psychosocial Work Environment: A cross-sectional study

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Abstract

Background
Previous studies have demonstrated poor health of care workers in nursing homes. Yet, little is known about the prevalence of physical and mental health outcomes, and their associations with the psychosocial work environment in nursing homes.

Objectives
(1) To explore the prevalence of physical and mental health outcomes of care workers in Swiss nursing homes, (2) their association with psychosocial work environment.

Methods
This is a secondary data analysis of the cross-sectional Swiss Nursing Home Human Resources Project (SHURP). We used survey data on socio-demographic characteristics and work environment factors from care workers (N=3,471) working in Swiss nursing homes (N=155), collected between May 2012 and April 2013. GEE logistic regression models were used to estimate the relationship between psychosocial work environment and physical and mental health outcomes, taking into account care workers` age.

Results
Back pain (19.0%) and emotional exhaustion (24.2%) were the most frequent self-reported physical and mental health. Back pain was associated with increased workload (OR 1.52, CI 1.29-1.79), conflict with other health professionals and lack of recognition (OR 1.72, CI 1.40-2.11), and frequent verbal aggression by residents (OR 1.36, CI 1.06-1.74), and inversely associated with staffing adequacy (OR 0.69, CI 0.56-0.84); emotional exhaustion was associated with increased workload (OR 1.96, CI 1.65-2.34), lack of job preparation (OR 1.41, CI 1.14-1.73), and conflict with other health professionals and lack of recognition (OR 1.68, CI 1.37-2.06), and inversely associated with leadership (OR 0.70, CI 0.56-0.87).

Conclusions
Physical and mental health among care workers in Swiss nursing homes is of concern. Modifying psychosocial work environment factors offer promising strategies to improve health. Longitudinal studies are needed to conduct targeted assessments of care workers health status, taking into account their age, along with the exposure to all four domains of the proposed WHO model.

Keywords: care worker, health, nursing home, work environment

Introduction

The WHO defines a healthy workplace as a place that *"(…) provides all members of the workforce with physical, psychological, social and organizational conditions that protect and promote health (…)"* [1]. Care workers in health services are at substantial risk for compromised health, both physically and mentally [1]. In 2012, Switzerland reported 3.1 injuries per 100 full-time workers in the health sector [2], similar to those reported in the U.S. health sector [3]. Physical health includes not only diagnosed illnesses, but also conditions in which the person has no specific disease, yet is not at optimal health. Similarly, mental health may not always reach the level of a diagnosable disorder, yet it can still make the worker suffer [1].

While recent studies have extensively examined the physical and mental health of hospital care workers [4-7], the nursing home setting has been less researched internationally. For example, in Switzerland, the introduction of Diagnostic Related Group (DRG) [8] has set the trend for nursing homes to deliver sub-acute care to residents with complex medical conditions. The majority of residents is diagnosed with dementia or demonstrates the symptoms, and requires assistance in the activities of daily living. Despite the availability of some ergonomic tools for lifting, care workers do not use them consistently, and they participate in some high risk nursing tasks (e.g. injections of medications and capillary/venous blood sampling). As a result, nursing home care workers perform many physically & emotionally straining activities that put them at risk of injuries.

Musculoskeletal injuries (e.g. back pain) have been reported as one of the most predominant physical health outcomes among care workers in nursing homes [9, 10], where job demands require frequent handling of patients in bed. Consequently, care workers often complain of back pain [11, 12]. Several of the studies that have examined musculoskeletal injuries, found that a positive work environment, including social support

at work [13], good relationship with colleagues [14], and the availability of ergonomic equipment and training programs, was associated with a decrease in the rate of compensation claims for injuries [15-17]. However, most of these findings are not generalizable to all nursing home care workers, as they were limited to nurse aides [18].

Another risk for compromised physical health condition is the exposure to needle stick injuries [19] and skin diseases [20, 21]. Previous studies found that the lack of training might explain the occurrence of these injuries [22] and dermatitis [21]. Despite the mounting risk, only few studies have examined the risk of needle stick injuries in nursing homes [19].

In addition to the physical strain and injuries, nurses are at risk of fatigue and emotional stress [23]. The transactional theory suggests that work environment and its stressors cause psychological strain responses in the person [24], which has an impact on the worker emotional health, such as feeling overwhelmed with work situations [25]. Some studies have identified work environment stressors as incompatible role expectations from the supervisor, interpersonal conflict, leadership styles and abusive supervision [25]. Nonetheless, few studies have examined the relationship between the work environment and emotional exhaustion in the nursing home setting. Evidence has shown that the work environment, specifically high job demands [26, 27], high workload, and low job autonomy [27] are associated with emotional exhaustion. Furthermore, a recent study on hospital nurse aides found that workplace violence was associated with minor emotional disorders [28].

Conceptual framework

The WHO Model of Healthy Workplace [1, 29] was proposed to describe the key components of a healthy workplace. The model focuses on four fundamental domains, specifically 1) the physical work environment, 2) the psychosocial work environment, 3) personal health resources, and 4) the enterprise community involvement to provide guidance for employers to explore worker`s health and to intervene, in order to sustain the organization. Our goal in this study is to examine to what extent selected factors (based on data available through the SHURP study) within one of the model domains, the psychosocial work environment, exist and related to care worker physical and mental health outcomes **(Figure1)**.

The psychosocial work environment includes the organizational culture and daily practices, which can affect both physical and emotional health, and may include work stressors, percentage of residents with dementia, staffing resources inadequacy, poor leadership, lack of workers` participation in decision making, poor collaboration with the management and among colleagues, low job autonomy, and workplace violence.

To date, there is a lack of international as well as Swiss studies about the health of nursing home care workers (including registered nurses, licensed practical nurses, certified nursing assistants, and nurse aides) and the impact of the work environment as a risk factor. Accordingly, the purpose of this study was to

1. Explore the prevalence of physical and mental health outcomes among care workers in Swiss nursing homes.
2. Explore the association between selected factors in the psychosocial work environment and health outcomes of care workers.

Methods

Study design, setting, and sample

This is a secondary data analysis of the multi-center, cross-sectional study Swiss Nursing Homes Human Resources Project (SHURP). Sampling and survey methods of the SHURP study are described in detail elsewhere [30].

The SHURP study included a representative random sample of 162 nursing homes across Switzerland, stratified according to language region, size, and profit status of the nursing home. Nursing homes smaller than 20 beds, residential homes, and rehabilitation clinics for geriatrics were excluded. After excluding facilities and units that did not provide data on unit level characteristics, a sub-sample of 155 facilities was included in the current study.

In the parent study, 6,947 questionnaires were distributed and 5,323 were returned resulting in an overall 76.6% response rate. Care workers of all educational levels who provided direct care to the nursing home residents, in addition to managers of the nursing home facilities, were invited to complete the questionnaire survey. Care workers who had worked less than 8 hours weekly, less than 1 month on the unit, or who were students were excluded. In the current study, we excluded respondents with leadership positions (middle and upper management n=805) regardless of their professional category (registered nurses and licensed practical nurses), and units with missing responses from the total sample, resulting in a sub-sample of 3,471 care workers (including registered nurses, licensed practical nurses, certified nursing assistants, and nurse aides).

Data sources, variables and measurements

Socio-demographic and professional data on care workers, including their perception of their work environment, work stressors, workplace violence, and physical and mental health outcomes, were collected using the Care worker Personnel Questionnaire of the SHURP study.

The nursing home facility characteristics and the number of residents with dementia present on the unit were captured from the administration SHURP Facility Profile and Unit Profile questionnaires, respectively.

The SHURP study has established the content validity of each of the scales used by testing the relevance of each variable and scale separately, and obtaining item content validity index (I-CVI) and scale content validity index (S-CVI), respectively. Further information related to the development of the questionnaire and the survey validity pre-testing are described elsewhere [30]. In the current study, we used the following variables:

Care worker and facility characteristics

Care workers and facility characteristics are used as control variables (except for care workers` age, treated a risk factor) to describe the study sample, as they are major in this topic. The socio-demographic data included: age; gender; professional category (i.e. registered nurses, licensed practical nurses/certified nursing assistants, nurses aides); professional experience in nursing in years; percentage of time employed corresponding to number of hours worked per week (ranging from 8hrs/week=20% to 42hrs/week=100% employment); usual work shifts (days/evenings/nights, days/evenings, or night shifts); overtime frequency (1 to 4 ranging from1=almost every shift, 2=every 2-4 working days, 3= every 5-7 working days, to 4=less frequently). The professional categories of the care workers were based on their nursing education level, as follows: registered nurses with three to six years of education holding a diploma in nursing, bachelor degree (BSc.N. or equivalent) or higher; licensed practical nurses (LPN)/certified nursing assistants (CNA) with three and two years of education respectively; and nurse aides with short courses or on-the-job training. Care workers` age (in years); 1=18-30; 2=31-40; 3=41-50; 4=older than 50) was treated as a risk factor as it may have an impact on different health outcomes.

Facility characteristics included nursing home size (ranging from small: 20-49 beds, medium: 50-99 beds, to large: ≥100 beds), language region (German-, French-, Italian speaking area), and ownership status (private, private subsidized, public).

Physical and mental health outcomes

Four physical health outcomes were examined: self-reported back pain, joint pain, needle stick injuries, and work-related allergies. The occurrence of back pain and joint pain during the 4 weeks prior to the survey was measured on a 3-point Likert scale (1=not at all, 2=a little bit, 3=strongly) by two items from the Swiss Health Survey for [31]. For needle stick injuries, an item from the RICH-Nursing study questionnaire (Schubert, 2009) was used to ask care workers if they had injured themselves during the last 6 months with a needle stick or a sharp tool that was used on a resident in their nursing home (0=no injury, 1=yes). An investigator-developed item with a 3-point Likert-type response option (=not at all, 2=a little bit, 3=strongly) was used to ask about work-related allergies such as dermatitis and asthma during the past 4 weeks.

Four mental health outcomes were measured: self-reported tiredness, sleeplessness, headache, and emotional exhaustion related to work. The presence of tiredness, sleeplessness, and headache during the past 4 weeks was measured on a 3-point Likert scale (1=not at all, 2=a little bit, 3=strongly) using items from the Swiss Health Survey [31]. The feeling of exhaustion from work was measured on a 7-point Likert scale (ranging from 0=never, to 6=daily) using an item from the Maslach Burnout Inventory (MBI) [32].

Psychosocial work environment factors

Work stressors items were selected from the Health Professions Stress Inventory (HPSI) [33, 34] to measure the frequency of several work-related stressors measured by a 5-point Likert scale (0=never, 1=seldom, 2=sometimes, 3=often, 4=very often). To reduce the survey burden, we asked experts (holding at least a Certificate of Advanced Studies up

to a Master's degree with experience in nursing home care) from the gerontological field concerning the relevance of each question. Each item was rated for its understandability for nursing home personnel (yes/no), and for its relevance concerning resident safety on a 4-pont scale (1=not relevant, 2=somewhat relevant, 3=quite relevant, 4=very relevant). The item content validity (I-CVI) was calculated for each item as the percentage of experts who rated it 3 or 4. The average scale content validity (S-CVI/Ave) was calculated as the mean of all I-CVI. Reducing the items from 30 to 12, the psychometric analysis of the remaining items produced 3 sub-scales tested for internal consistency (Cronbach`s alpha) and measuring stress-producing factors: stress due to (1) workload (Cronbach alpha 0.73), (2) a lack of job preparation (Cronbach alpha 0.63), and (3) conflict and lack of recognition (Cronbach alpha 0.76). Stress due to workload was measured by three items that asked about dealing with difficult situations, having too much work to do, and there not being enough people working. Stress due to lack of job preparation was measured by three items asking about fear of committing mistake, being overwhelmed when caring for terminally ill residents, and not being prepared to meet the residents' needs. Conflict and lack of recognition was measured by six items that asked about disagreement with other professionals, conflicts with superiors, lack of information, not being asked about one's opinion, low pay, and underuse of skills. "Conflict" and "lack of recognition" were combined based on Exploratory Factor Analysis. The SHURP team did a multiple group EFA (three language region groups), and all factor loadings of the subscale conflict and lack of recognition were significant and above 0.3 (range 0.371-0.734; 90% CI 0.043-0.050).

The percentage of residents with dementia was calculated in reference to the total number of residents present on the units at the time of the survey. Residents diagnosed with dementia or manifested symptoms of dementia were included. This factor is included since

it often involves complex labor working with cognitively impaired residents and can induce stress among nursing home care workers.

Care worker perceptions about nursing home leadership and staffing adequacy were measured by items adapted for nursing home use from two subscales of the Practice Environment Scale of the Nursing Work Index (PES-NWI) questionnaire [35]*:* "Nurse manager ability, leadership, and support of care workers" (Cronbach alpha 0.843) and "Staffing and resources adequacy" (Cronbach alpha 0.743), respectively. Leadership included whether unit supervisor was perceived as supportive and as a competent leader, whether mistakes are used as a learning opportunity, an whether care workers receive reward and recognition for a job well done, and back up in decision making. Staffing adequacy included enough staff to get the work done, to provide quality care, and to discuss resident problems. Additionally, a single item assessing participation in decision-making was used. Items were rated on a 4-point Likert scale (1=strongly disagree, 2=slightly disagree, 3=slightly agree, 4=strongly agree).

Collaboration with the nursing director and collaboration with colleagues were adopted from the Safety Attitude Questionnaire (SAQ) [36], rated on a 4-point Likert scale (1=very low, 2=rather low, 3=rather high, 4=very high), allowing the answer option "don't know". In small sized nursing homes, the nursing director can hold managerial responsibilities such as nursing supervisor duties. As a result, all care workers can have collaboration with the nursing director. To measure autonomy at work, one investigator-developed item was used to ask care workers to rated the extent to which they agreed that they decided on their own how to go about doing their work. The item was rated on a 4-point Likert scale (1=strongly disagree, 2=slightly disagree, 3=slightly agree, 4=strongly agree).

Workplace violence was measured by the residents' verbal and physical aggressive behaviours toward care workers. The descriptions of verbal or physical aggression were derived from the Ryden`s Aggression Scale [37]. Care workers were asked about the frequency of resident physical and verbal aggressive behaviour towards them during the past 4 weeks on a 6-point Likert scale (0=never, 1=less than once a week, 2=approximately once a week, 3= several times a week, 4=daily, 5=several times a day).

Data Collection and Analysis

The SHURP survey was administered between May 2012 and April 2013. Further information related to data collection is described elsewhere in detail [30].

To address aim 1, we calculated descriptive statistics (frequencies, percentages, means, standard deviations)**.** For aim 2, we first used a bivariate logistic regression to explore associations between facilities and care workers characteristics and each physical and mental health outcome. We used generalized estimation equation (GEE) multiple regression models to take the clustering of care workers in nursing home units into account. In a second step, we used multiple logistic GEE regression models to estimate odds ratios (ORs) and 95% Confidence Intervals (CI) for risk factors (psychosocial work environment), adjusted for facility and care workers characteristics. We dichotomized all health outcomes in order to capture care workers with self-reported compromised health: back pain, joint ache, allergies, sleeplessness, tiredness, headache: 0= not at all and a little bit, 1=strongly; needle stick injuries: 0=no, 1=yes; emotional exhaustion: 0= never, several times a year or less, once a month or less, and several times a month, 1= once a week, several times a week, and daily. We also assessed multi-collinearity of all work environment factors with the variance inflation factor (VIF). Based on the VIF, all variables were kept because all values remained below the threshold of 5 [38]. To explore the robustness of the analysis to the model specifications we run the same regression

equations with dependent variables specified as ordinal variables, indicating similar results as in the binary logistic regression models. The maximum of missing responses per variable was 5%. We therefore applied list wise deletion to deal with missing data. All data analyses were conducted with IBM/SPSS for Mac Statistics 21.0.We report adjusted results of our GEE logistic regression models analysis.

Results

Description of sample

Overall, 155 nursing homes, and 3,471 care workers participated in the study. **Table 1** summarizes the characteristics of the facilities and the participants, as well as the work environment factors**.** Across all facilities, the majority of care workers were females (92.4%) and one third (33%) were older than 50 years. One fourth of the participants were registered nurses (23.6%), while the largest professional category was licensed practical nurses /certified nursing assistant (42.9%). As for employment percentage, less than one third were employed either full time (23.2%) or up to 50% (21.7%), with more than 20 years of nursing experience (23.9%). The majority of the respondents (75.0%) reported overtime less than once a week and only 2% reported doing overtime every shift. The majority of respondents worked day/evening shifts (56.3%). The care workers experienced a high degree of participation in decision-making (86.4%), collaboration (88.5%), and autonomy (80.8%) at work, all measures of psychosocial work environment. In terms of workplace violence, 25.3% of the respondents experienced verbal aggressiveness by residents several times a week or more often in the past four weeks.

Prevalence of Care workers health outcomes

Of the care workers, 38% and 27.4% reported at least one compromised physical health and one mental health outcome, respectively. Back pain (19.0%) and joint pain (13.5%) were more frequent in comparison to needle stick injuries (2.1%) and allergies

(1.0%) (**Table 2)**. Mental health outcomes were more prevalent than physical health outcomes. Emotional exhaustion from work (24.2%) was more common than tiredness (14.4%), sleeplessness (12.6%), and headaches (9.9%).

Association between work environment and care workers` health

In the development of the model, the analysis showed no differences among professional categories in relation to health outcomes. However, along with age, psychosocial work environment factors were correlated with care worker reported physical and mental health outcomes **(Table 3)**. Back pain was associated with increased workload stress (OR 1.52, CI 1.29-1.79), stress due to conflict with other health professionals and lack of recognition (OR 1.72, CI 1.40-2.11), and frequent verbal aggression by residents towards care workers (OR 1.36, CI 1.06-1.74), and inversely associated with staffing adequacy (OR 0.69, CI 0.56-0.84), lack of job preparation (OR 0.70, CI 0.57-0.85), and all age groups (31 to 40 years: OR 0.70, CI 0.51-0.97; 41-50 years: OR 0.54, CI 0.38-0.77; older than 50 years: OR 0.46, CI 0.33-0.66). Joint pain was associated with increased perceptions of workload (OR 1.57, CI 1.28-1.92), conflict with other health professionals and recognition stress (OR 2.06, CI 1.62-2.63), frequent verbal aggression by residents (OR 1.50, CI 1.12-2.02), care workers older than 50 years (OR 1.93, CI 1.28-2.91), and inversely associated with perceived staffing adequacy (OR 0.75, CI 0.58-0.95). There were no significant associations between the psychosocial work environmental factors and age groups measured and needle stick injuries or work-related allergies.

We also found several associations between the psychosocial work environment, and age groups and mental health outcomes. Sleeplessness was associated with increased workload stress (OR 1.52, CI 1.26-1.84), conflict with other health professionals and lack of recognition stress (OR 1.92, CI 1.52-2.41), and care workers older than 50 years (OR 1.52, CI 1.03-2.24). Tiredness was associated with increased workload stress (OR 2.11, CI

1.74-2.58) and conflict with other health professionals and lack of recognition stress (OR 2.06, CI 1.66-2.55), and was inversely associated with perceptions of staffing adequacy (OR 0.68, CI 0.54-0.86), self-reported autonomy (OR 0.66, CI 0.50-0.87), and care workers older than 40 years (41-50: OR 0.44, CI 0.30-0.65; older than 50: OR 0.37, CI 0.23-0.57). Headache was associated with increased workload stress (OR 1.27, CI 1.04-1.55) and conflict with other health professionals and lack of recognition stress (OR 2.11, CI 1.65-2.70), and inversely associated with collaboration with the nursing director (OR 0.68, CI 0.47-0.99), and care workers older than 40 years (41-50: OR 0.55, CI 0.36-0.86; older than 50: OR 0.42, CI 0.27-0.66). Emotional exhaustion was associated with increased workload stress (OR 1.96, CI 1.65-2.34), lack of job preparation stress (OR 1.41, CI 1.14-1.73), and conflict and lack of recognition stress (OR 1.68, CI 1.37-2.06), and was inversely associated with care workers' perceptions about leadership (OR 0.70, CI 0.56-0.87), and care workers of all age groups (31-40: 0.65, CI 0.48-0.89; 41-50: OR 0.55, CI 0.40-0.76; older than 50: OR 0.58, CI 0.41-0.81).

Discussion

This Swiss nursing home study reports on compromised physical and mental health outcomes among professional care workers in relation to selected psychosocial work environment factors. The most prevalent physical and mental outcomes were back pain and joint pain, and emotional exhaustion, tiredness, sleeplessness, and headache. Along with age, the psychosocial work environment factors such as work stressors and staffing adequacy showed a relationship with the physical and mental health care worker outcomes measured. Other factors that may be perceived as potential risk factors (e.g. percentage of residents with dementia, physical violence) or potential protective factors (e.g. participation in decision making) were not associated with the health of care worker outcomes examined.

The study findings about back pain and joint pain confirmed that musculoskeletal

injuries rank high in nursing homes, in agreement with previous studies [11-13, 39]. In nursing homes, older people depend on the care provider to meet their daily needs such as bathing, toileting, eating, lifting, repositioning, and transferring [40]. The low prevalence rate of work-related allergies, including dermatitis, was inconsistent with a European study which revealed skin diseases are a prevalent problem in nursing homes [20], but confirmed results from a study conducted in Southern Taiwan [21] where dermatitis occurred less frequently in nursing home care workers. Although we found relatively few needle stick injuries they could still pose a serious hazard for nursing home care workers [22]. Furthermore, evidence showed that care workers underreport needle stick injuries [41] due to either lack of time [42] or due to their belief that needles were not contaminated [22]. We speculate that care workers may have underestimated both needle stick injuries and skin allergies. However, our assumption warrants further research for validation.

In addition to physical health, our study examined adverse mental health outcomes and showed that nearly one fourth of our sample reported emotional exhaustion, and between 10% and 14% tiredness, sleeplessness, and headaches, which is in line with other study findings [23, 26, 43]. It might appear plausible that the intensive nature of the labour and resident care in nursing homes can place care workers at risk of general fatigue, headaches, emotional and social dysfunction, and sleeplessness [43].

Psychosocial work environment factors showed an association with physical health outcomes. Specifically, high workload stress, conflict with other health professionals and lack of recognition stress, and perceptions of inadequate staffing were associated with back pain and joint pain. Consistent with our findings, in another study, care workers who experienced high workload were exposed to major risks for musculoskeletal injuries [11]. Some daily work processes that might explain include care workers experiencing conflict with colleagues, time pressure, and increased mechanical workload to meet resident care

demands which could increase awkward posturing and repetitive movement at work [44].

Verbal aggression of nursing homes residents towards care workers was also associated with back pain and joint pain, in agreement with a recent study [45]. Despite limited research investigating the association between workplace residents' verbal aggressiveness and physical injuries, there is some evidence showing that musculoskeletal pain/inflammation are more common among care workers exposed to verbal violence [45]. Other studies reported that verbal aggression against care workers can provoke considerable stress [45, 46]. A possible explanation for the association between verbal aggression and physical injuries is a muscle tension [45]. Our study precludes making any causal inferences in this regard, but indicates the need for further exploration.

Counter intuitively, we found that stress related to poor preparation for the job was associated with reduced self-reported back pain. A plausible explanation might be that those who have not received appropriate training in ergonomics might have low self-confidence in their skills, which may explain their lack of involvement in strain producing tasks, compared to those prepared. Yet, further investigation is necessary to validate these results, as no previous studies have examined this relationship to our knowledge.

Previous studies on geriatric care workers [47] found that the prevalence of back pain and other musculoskeletal pain increased with age, which was confirmed in our study for joint pain but not back pain. Contradictory results for the effect of age on care workers` health also exist and suggest that age is a poor predictor for back pain [48]. A plausible explanation of this inconsistency could be either that those who suffer from back pain tend to leave their work, or that care workers with older age have accumulated ergonomic skills, which protect them from back pain. This interpretation warrants further investigation.

Moreover, our findings suggested an association between stress related to workload and conflict with other health professionals and lack of recognition and mental health

outcomes (sleeplessness, tiredness, headache, and emotional exhaustion). In addition, perceptions of greater staffing adequacy were associated with reduced odds of reporting tiredness. Similarly, while perceptions of strong leadership were associated with low-reported emotional exhaustion, high autonomy at work was associated with lower odds of reporting tiredness, and high collaboration with the nursing director was associated with lower odds of headache. In alignment with our findings, earlier studies have found that exposure to work stressors, including high workload and high job demands [27, 49, 50], lack of coworker [27, 50] and management [27] support, and low job autonomy [27, 50] were associated with poor mental health outcomes. This imbalance can be explained by Cannon`s Stress Theory [51], where prolonged exposure to stressors induce a disruptive biological system with the disruption preventing coping with changes, resulting in poor mental health outcomes such as sleeplessness, fatigue, headaches, and social and emotional dysfunction [43].

We also found that stress due to lack of job preparation was associated with an increased likelihood of reporting emotional exhaustion. Previous research has shown that on-the-job training and mastery of skills can help manage demanding situations [52]. However, the reason for this finding in relation to reports of emotional exhaustion in our sample is unclear.

Finally, results showed that age is correlated to mental health outcomes. Sleeplessness was positively related to age, which may be explained by the slow down of the circadian rhythm with increased age, causing sleeping disorders [53]. However, tiredness, headache and emotional exhaustion were inversely related to increased age, which was supported by a previous US study on nursing mental health [54]. This may reflect the fact that older care workers have built confidence and professional skills that help them deal with difficult situations at work.

Strengths and limitations

The SHURP study is the first national representative survey to comprehensively survey health of care workers in Swiss nursing homes and to comprehensively examine the association between different factors of their work environment and physical and mental health outcomes. The findings of this study should, however, be interpreted in light of some limitations. First, the cross-sectional design did not allow us to make causal inferences about the relationships that were found. Nevertheless, our findings will inform stakeholders and future prospective studies about system factors associated with care workers health outcomes. Second, the secondary data analysis limited our ability to fully evaluate the impact of all domains of the proposed model (cf. Figure 1) on care workers` health. Third, the outcome variables used in this study were exclusively self-reported, which could be a source of bias. Yet, self-reported care workers' perception of health has been shown empirically to be a good indicator of health status [55]. For future research, the collection of more objective data or observer reported data are recommended, such as observation or medical examination of the physical and mental health of care workers. Fourth, the lack of a comparison group from the normal population does not allow contextual interpretation of the health findings. Finally, our cross sectional study prevented us from tracking care workers who have left their nursing home workplace due to worse health conditions, which may have led to an underestimation of reported poor care workers` health.

Conclusions

In conclusion, along with age, poor psychosocial work environmental factors in nursing homes were related to the physical and mental health of care workers. Modifying psychosocial work environment factors in Swiss nursing homes is a promising strategy to improve the health of their care workers. Longitudinal studies are needed to conduct

targeted assessments of care workers health status, taking into account their age, along with the exposure to all four domains of the proposed model.

Ethical approval: The study aims are covered by the SHURP study, for which the ethic committee of the state of 'beider Basel' (Ref.Nr granted ethical approval. EK:02/12) gave approval. All participating nursing home administrators and nursing directors gave written consent for the SHURP study. The return of the care worker SHURP questionnaires was treated as an informed consent.

Conflict of interest: No conflicts of interest declared

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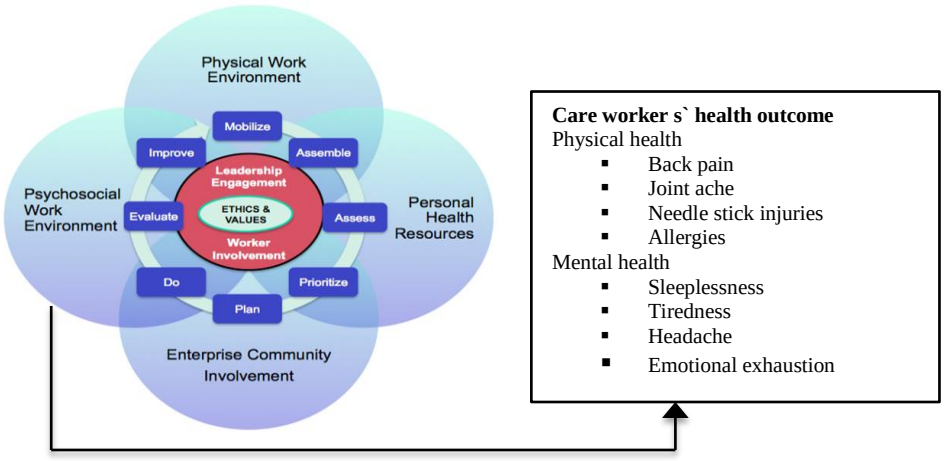
Figure 1. The WHO Model of Healthy Workplace



Adopted from (Burton, 2010; Neira, 2010).

Table1. Characteristics of nursing home facilities, care workers, and work environment factors

Nursing home characteristics (N=155 facilities)	**n (%)**	**Mean (SD)**
Language speaking region		
German	117 (75.5)	
French	29 (18.7)	
Italian	9 (5.8)	
Profit status		
Public	68 (37.4)	
Private subsidized	40 (25.8)	
Private	57 (36.8)	
Nursing home size		
Small (20-49beds)	60 (38.7)	
Medium (50-99 beds)	73 (47.1)	
Large (≥100 beds)	22 (14.2)	
Care worker characteristics (N=3,471)		
Gender (n= 3456)		
Females	3192 (92.4)	
Age groups (years)(n=3402)		
18-30	751 (22.1)	
31-40	600 (17.6)	
41-50	929 (27.3)	
>50	1122(33.0)	
[1]*Nursing job category (n=3471)*		
Registered Nurse	912 (26.3)	
LPN/CNA	1488 (42.9)	
Nurse Aide	1071 (30.9)	
Employment percentage (n=3430)		
Up to 50%	745 (21.7)	
51%-90%	1889 (55.1)	
>90%	796 (23.2)	
Professional experience in nursing (years) (n=3360)		
Up to 5	720 (21.4)	
6-10	803 (23.9)	
11-15	613 (18.2)	
16-20	420 (12.5)	
>20	804 (23.9)	
Overtime Frequency (n=3450)		
Almost every shift	65 (1.9)	
Every 2-4 working days	285(8.3)	
Every 5-7 working days	511 (14.8)	
Less frequently	2589 (75.0)	
Usual shifts (n=3446)		
Regular change of shift	1294 (37.6)	
Day/evening only	1939 (56.3)	
Night only	213 (6.2)	

Table1. Continued	**n (%)**	**Mean (SD)**
Psychosocial work environment		
Leadership (n=3471)		3.14 (0.60)
Work stressors		
Workload (n=3467)		1.56 (0.83)
Lack of job preparation (n=3464)		0.68 (0.59)
Conflict & lack of recognition (n=3467)		0.91 (0.67)
Residents (%) with dementia (n=401 units)		61.85 (24.41)
Staffing adequacy (n=3468)		2.82 (0.67)
[2]*Workplace Violence towards care worker* (Several times a week to several times a day)		
Verbal aggression (n=3456)	873 (25.3)	
Physical aggression (n=3455)	394 (11.4)	
[3]*Participation in decision making (n=3455)*	2985 (86.4)	
[4]*Collaboration with*		
Nursing Director (n=3271)	2894 (88.5)	
Colleagues *(n=3429)*	3281 (95.7)	
[3]*Autonomy (n=3450)*	2786 (80.8)	

[1] registered nurses or higher received 3-6 years of education; licensed practical nurses (LPN)/certified nursing assistant (CNA) received 2-3 years of education; nurse aides received on the job training.
[2] Workplace violence: 0=never, less than once a week, approximately once a week; 1= several times a week, daily, several times a day;
[3] Participation& autonomy: 0=strongly disagree, slightly disagree, 1=slightly agree, strongly agree;
[4] collaboration: 0=very low, rather low; 1=rather high, very high; 2=Don't know. Group "1" is being reported.

Table2. Prevalence of workplace physical and mental health outcomes

Physical health outcomes (care worker-reported)	**n (%)**
*Needle stick injuries (n=3457)	71 (2.1)
**Allergies (n=3459)	36(1.0)
**Back pain (n=3450)	655 (19.0)
**Joint pain (n=3446)	464 (13.5)
Total physical health outcomes (n=3410)	
≥ 1 Physical health reported outcomes	1296 (38)
Mental health outcomes (care worker-reported)	**n (%)**
**Sleeplessness (n=3442)	432 (12.6)
**Tiredness (n=3442)	494 (14.4)
**Headache (n=3430)	339 (9.9)
***Emotional Exhaustion (n=3442)	834 (24.2)
Total mental health outcomes (n=3433)	
≥ 1 Mental health reported outcomes	939 (27.4)

*Needle stick injuries: 0= no, 1=yes;
**Allergies, Back pain, joint ache, headache, tiredness, sleeplessness: 0=never & a little bit; 1=strongly;
***Emotional exhaustion: 0= never, several times a year or less, once a month or less, and several times a month, 1= once a week, several times a week, and daily.
Group "1" is being reported.

Table 3. Associations between age, work environment and mental and physical health outcomes✝

Explanatory variables	**Physical health outcomes**			
	Back pain OR (95%CI)	**Joint pain OR (95%CI)**	**Needle stick injuries OR (95%CI)**	**Allergies OR (95%CI)**
[1]*Age groups (years)*				
▪ 31-40	0.70 (0.51-0.97)*	1.19 (0.78-1.81)	1.27 (0.51-3.13)	2.59 (0.76-8.86)
▪ 41-50	0.54 (0.38-0.77)**	1.41 (0.93-2.15)	1.06 (0.39-2.87)	0.75 (0.18-3.10)
▪ >50	0.46 (0.33-0.66)**	1.93 (1.28-2.91)**	0.89 (0.37-2.16)	0.47 (0.10-1.24)
Psychosocial work environment				
Leadership	1.11(0.87-1.42)	1.11(0.84-1.46)	0.68(0.38-1.22)	0.42(0.14-1.31)
Work stressors				
▪ Workload	1.52(1.29-1.79)**	1.57(1.28-1.92)**	0.77(0.51-1.16)	1.33(0.69-2.56)
▪ Lack of job preparation	0.70(0.57-0.85)**	0.91(0.71-1.16)	1.66(0.97-2.85)	1.61(0.83-3.10)
▪ Conflict & lack of recognition	1.72(1.40-2.11)**	2.06(1.62-2.63)**	1.36(0.81-2.30)	2.01(0.94-4.33)
▪ Percentage of residents with dementia	0.99(0.99-1.0)	0.99(0.99-1.0)	1.00(0.99-1.02)	0.99(0.97-1.01)
Staffing adequacy	0.69(0.56-0.84)**	0.75(0.58-0.95)*	0.66(0.40-1.10)	1.06(0.48-2.33)
[2]*Workplace Violence towards care worker*				
▪ Verbal Aggression	1.36(1.06-1.74)*	1.50(1.12-2.02)**	0.99(0.48-2.08)	2.17(0.94-5.0)
Physical Aggression	1.02(0.74-1.40)	0.91(0.64-1.33)	0.91(0.33-2.53)	0.47(0.15-1.46)
[3]*Participation in decision making*	1.11(0.79-1.58)	1.30(0.91-1.86)	1.30(0.57-2.94)	1.99(0.60-6.55)
[4]*Collaboration*				
▪ Nursing Director	0.90(0.66-1.23)	0.80(0.57-1.13)	1.23(0.53-2.85)	1.56(0.48-5.10)
▪ Colleagues	1.25(0.78-1.99)	1.73(0.95-3.13)	1.27(0.40-4.09)	0.94(0.21-4.05)

Table 3.Continued

[3]*Autonomy*	0.97(0.74-1.26)	1.10(0.81-1.44)	1.18(0.65-2.12)	0.75(0.38-1.46)
Explanatory variables	**Mental health outcomes**			
	Sleeplessness OR (95%CI)	**Tiredness OR (95%CI)**	**Headache OR (95%CI)**	**Emotional Exhaustion OR (95%CI)**
[1]*Age groups (years)*				
▪ 31-40	0.84 (0.55-1.30)	0.67 (0.43-1.04)	1.08 (0.71-1.66)	0.65 (0.48-0-89)**
▪ 41-50	1.02 (0.67-1.56)	0.44 (0.30-0.65)**	0.55 (0.36-0.86)**	0.55 (0.40-0.76)**
▪ >50	1.52 (1.03-2.24)*	0.37 (0.23-0.57)**	0.42 (0.27-0.66)**	0.58 (0.41-0.81)**
Psychosocial work environment				
Leadership	0.75(0.56-1.0)	1.12(0.84-1.49)	1.04(0.79-1.40)	0.70(0.56-0.87)**
Work stressors				
▪ Workload	1.52(1.56-1.84)**	2.11(1.74-2.58)**	1.27(1.04-1.55)*	1.96(1.65-2.34)**
▪ Lack of job preparation	0.98(0.78-1.22)	0.8(0.64-1.0)	0.87(0.68-1.11)	1.41(1.14-1.73)**
▪ Conflict & lack of recognition	1.92(1.52-2.41)**	2.06(1.66-2.55)**	2.11(1.65-2.70)**	1.68(1.37-2.06)**
▪ Percentage of residents with dementia	0.99(0.99-1.0)	0.99(0.99-1.00)	0.99(0.99-1.0)	1.00(0.99-1.01)
Staffing adequacy	0.92(0.73-1.17)	0.68(0.54-0.86)**	0.86(0.65-1.14)	0.84(0.68-1.03)
[2]*Workplace Violence towards care worker*				
▪ Verbal Aggression	1.27(0.94-1.72)	1.03(0.77-1.37)	0.98(0.67-1.37)	1.24(0.97-1.60)
▪ Physical Aggression	1.28(0.87-1.87)	0.97(0.64-1.47)	1.14(0.77-1.71)	1.05(0.75-1.47)
[3]*Participation in decision making*	0.98(0.69-1.39)	1.31(0.89-1.95)	1.18(0.78-1.79)	1.30(0.94-1.80)

Table3.Continued

[4]*Collaboration with*				
▪ Nursing Director	0.79(0.55-1.14)	0.73(0.51-1.04)	0.68(0.47-0.99)*	0.99(0.74-1.34)
▪ Colleagues	0.65(0.41-1.04)	0.96(0.57-1.62)	1.67(0.89-3.14)	1.22(0.76-1.97)
[3]*Autonomy*	0.92(0.70-1.21)	0.66(0.50-0.87)**	0.95(0.68-1.31)	0.93(0.72-1.20)

†Multiple regression models included all variables. The adjusted models were controlled for facility characteristics (language region, profit status, size) and care worker characteristics (gender, nursing job category, overtime frequency, employment percentage, professional experience in nursing in years, & shift work).
[1]Age groups (years)**:** 1=18 to 30; 2=31 to 40; 3=41 to 50; 4= older than 50. Groups 2, 3 and 4 are reported in comparison to group "1".
[2]Workplace violence: 0=never, less than once a week, approximately once a week; 1= several times a week, daily, several times a day; [3]Participation& autonomy: 0=strongly disagree, slightly disagree, 1=slightly agree, strongly agree; [4]collaboration: 0=very low, rather low; 1=rather high, very high; 2=Don't know. Group "1" is reported in comparison to group "0" (reference group).
*p-value<0.05; **p<0.01